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Implications of the Relation between Language and Writing from a Developmental Perspective

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Writing interprets orality to a greater extent than orality interprets writing.[1]

Raúl Dorra

The relationship between writing and language has been problematized from different disciplinary fields in the last decades. In this paper, I am interested in bringing into this debate one of the best established points so far: writing is an analysis of language performed using graphical marks (Cárdenas, 2001). Although the purpose of this article is to account for the way this analysis is performed throughout development, it is necessary to adopt a position on the type of relationship that writing establishes with language. I will adhere here to Vachek's (1973) point of view: the "relation holding between the graphical and the phonic elements is not reference but correspondence". He explains his position in these terms:

> It seems there are no written norms based on an exclusive correspondence on one and the same language level. It seems certain, in other words, that all written norms constitute various kinds of compromises between the correspondences established on various levels. (Vachek, 1973, p. 25.)

Such a stand allows us to comprehend that graphical units correspond to phonic units, but also to morphologic and lexical units. Furthermore, this perspective provides an explanation for the role of graphical elements in delimitation and classification of syntactic units, or even textual or discursive units.

1. All quotes taken from sources in Spanish have been translated into English for this paper.

This functionalist approach demands "a status to a degree independent of that of spoken language" (Vachek, 1973, p. 14). The Czech linguist rejects Uldall's idea that the difference between speech and 'writing' is just one of mere substance. This statement is based in the general principles of glossematic theory. Vachek maintains that the spoken and the written norm of language "appear to be functionally complementary" (Vachek, 1973, p. 16). In fact,

> [t]he spoken norm of language is a system of phonically manifestable language elements whose function is to react to a given stimulus […] in a dynamic way *i.e.* in a ready and immediate manner, duly expressing not only the purely communicative but also the emotional aspect of the reacting language user. The written norm of language is a system of graphically manifestable language elements whose function is to react to a given stimulus *i.e.* in a preservable and easily surveyable manner, concentrating particularly on the purely communicative aspect of the reacting user. (Vachek, 1973, pp. 15-16.)

That is the reason why Vachek claims that the written norm is the marked member of the opposition, because it is used to fulfill higher cultural and/or civilizational purposes and functions.

When he considers the structural correspondences of the two language norms, he rejects the existence of a universal linguistic norm (a 'langue,' from de Saussure's point of view), which subordinates both norms. In 1939, he already maintained

> *Eine vollkommen analogische Beschaffenheit* [*der Schrift- und Sprechnorm*] *würde bedeuten, dass jedes funktionell verwendbare akustische Element sein graphisches Gegenstück in der Schriftnorm bessäse, und umgekehrt. Wir sehen also, dass keine vollkommen analogische Struktur von Schrift- und Sprechnorm in keiner Sprachgemeinschaft vorhanden ist.* (Vachek, 1939, pp. 116-117.)

On the contrary, Nina Catach, upon the basis of Hjelmslev theory, postulates that oral language is complementary to written language. She considers that it is necessary to postulate the existence of an abstract system of correspondences: the '*langue*', and L' (*l'écriture comme plurisystème ou théorie de L' prime*). According to this theory, a language with a writing system becomes richer and it is transformed by the interaction between orality and writing. She agrees with Vachek that every writing system is mixed, but she has expressed this idea with the terms of Hjelmslev's theory: there are writing systems essentially cenemic or essentially pleremic, but every writing system uses both types of signs. Moreover, a single element can be used as cenemic or pleremic sign (Catach, 1996). All in all, the autonomy of written language is reduced compared to the functionalist approach.

The present article is highly influenced by Vachek's perspective, because his approach is suitable for revealing the types of conflicts that children undergo in the process of becoming literate. The main aim is to discuss how children rise to the challenge of establishing correspondences between spoken and written norms at different language levels. In this paper, I will make reference to different theories that provide support for the argument, but it should be clear that no thorough

review of psycholinguistics theories about writing is intended. I will examine the influence of written norms at different levels, discussing the different theoretical perspectives that have dwelled upon the topic. Next, I analyze the first linguistic level where a correspondence between graphical signs and language in alphabetical writing systems is established: the phonological level, at ages when children usually begin the construction of a writing system (ages five or six, in Western culture).

1. Correspondences of the alphabetical writing system at the phoneme level: analysis of the written chain into discontinuous units

In this section, I will reflect on the way children analyze the spoken chain into discontinuous units from three different approaches: phonological, constructivist and statistical learning perspectives. All of them maintain different points of view as regards learning, writing systems and their role in the development of initial alphabetization.

The phonological perspective reveals the alphabetical nature of writing systems that researchers typically work on (English, French, Italian, Spanish and Portuguese). Let us remember that North American linguistics, in its foundational moments, had already maintained that "writing is not language, but merely a way of recording language by means of visible marks" (Bloomfield, 1933, p. 21). Owing to this conception, writing thus becomes a transcription code for oral speech, in which the constitutive elements are the connections between sounds—sounds that, in the case of alphabetical writing, are the phonemes—and letters. From this perspective, it is indispensable for initial alphabetization that children learn the specific sound-letter correspondences. However, as one of the representatives of this line of thought in Argentina expressed: "the great advantage of the alphabetical system—the reduced number of associations that must be learned—is overshadowed, in principle, by the disadvantage or the difficulty that children have before realizing that words are formed by sounds" (Borzone de Manrique, 2002).

It is necessary to take into account the fact that five or six year old children, who start to learn writing, already possess knowledge of their own language as speakers. Nevertheless, this knowledge remains unconscious. Certainly speakers develop unconscious and automatic processes of analysis in their usual activities of perceiving and comprehending spoken language, but these are different from the ability to explicitly analyze speech in its phonological components and manipulate them in a deliberate way, namely, phonological awareness.

According to research following this line of thought, there is a fundamental relationship between phonological awareness and learning to read or write. However, there are differences as regards the predictive and causal force of both skills, since metaphonological ability varies according to the type of task involved and the linguistic level at which it operates. There is no agreement between researchers concerning the possibility of developing (or not) a phonological

awareness starting from the levels that are easier to develop—first syllabic, then intrasyllabic in attack and rhyme—towards those that are more inaccessible—like the segmental level. Nevertheless, it is maintained that establishing relationships between phonemes and phonetically appropriate letters is what lies at the base of the development of reading and writing skills. Authors appeal both to the explicit teaching of such correspondence and to the direct teaching of the skills involved in phonological awareness.

This line of thought conceives of learning in direct relation to teaching, as if it were a development of skills, and therefore sensitive to systematic instruction or even training. We must keep in mind that children may have their own conception with regard to writing. Pollo, Treiman & Kessler (2008, p. 13) maintain that researchers from a phonological perspective only "see in children's earliest spellings a random string of letters", a fact that shows that they do not believe that children organize data following their own schemes. Unlike advocates of psychogenesis, they do not consider learning to be a construction of knowledge in which the subjective schemes play a part, but rather a conformation of behavioral associations and modifications due to progressive internalizations of associations that are taught in an explicit way. Hence the importance ascribed to the knowledge of the names of letters, knowledge which is of special importance in languages such as English and French. Their notion of learning also reveals that scholars in this line of thought postulate the existence of a mind specialized into different domains. It can be noticed how specific, gradual and intensive the stimuli for learning to write and read are, as well as the work proposed to develop phonological awareness. Moreover, and despite the emphasis put on the explicit teaching of associations and skills, it cannot be denied that their conception of learning presupposes a mind, since teaching explicitly tends to the domain of "the establishment of relations between new information elements and the control of executive and metacognitive strategies in general" (Carretero, 2001, p. 260).

The second perspective that will be dealt with is that of constructivism, present in the field of initial alphabetization as a contribution from a domain-general theory of development, like Piaget's, since changes affect the representational structures, operating on every domain of the cognitive system: logical relations, mathematics, language, physics, ethics, etc. According to this theory, learning presupposes an active construction of knowledge by the subject, based on three biologically determined foundational processes (assimilation, accommodation and equilibration). There is no underlying behaviorist theory here since "every action that is repeated or generalized when applied to new objects engenders, due to this same fact, a 'scheme', that is, a type of praxical concept" (Piaget, 1983, p. 52). Objects, then, are assimilated into these schemes, that, in time, adapt themselves to the characteristics of these objects. Therefore, from this perspective, "the action of a stimulus requires the presence of a scheme which constitutes the true source of the response" (Piaget, 1983, p. 52).

Additionally, the conception of learning underlying constructivism allows us to differentiate it from teaching, since children do not always learn things in the same way they are taught. This position contradicts one of the assumptions that seems to underpin the didactic derivations of the phonological perspective. Indeed, the ability to understand and learn new information is determined by the subject's schemes.

The writing development theory presented by Ferreiro, an Argentinian disciple of Jean Piaget, maintains that since the beginning of the relationship of a child with writing, the child has spontaneous ideas about this object and this occurs much earlier than schooling. Such ideas respond to schemes that are shaped and change in the course of time through the child's interaction with writing. Therefore, constructivist researchers note certain regularities in written productions of children that are not yet conventional. Such regularities obey quantity, variety and differentiation hypotheses, which children spontaneously construct in an autonomous and independent way from any external teaching. One of the most important contributions of this school of thought is having demonstrated that these early spontaneous conceptions orientate the whole process of writing acquisition. Thus, where researchers from a phonological perspective only see random combinations of letters corresponding to the first stages of writing, Ferreiro observes the conceptions that will orchestrate the construction of the alphabetic principle, which are already present in pre-alphabetic productions. Children's hypotheses change constantly due to learning and their experience with writing, but also due to the internal dynamic of the schemes, that supposes an internal resolution of conflicts with their own constructions. The consideration of changes in subjective schemes due to contradiction with external data—but also due to functional mechanisms that allow the progressive achieving of balance—is vital to the conception of writing and development maintained by this line of thought.

This new representation, writing, is built by children in levels. In the first, pre-syllabic level, children do not believe writing represents language and each string of letters is interpreted as a whole word. In the syllabic stage, children make one-to-one correspondences between letters and syllables, because these are the units they identify in the speech chain. The letters they use are not pertinent in the word context, but later they use for each syllable one of the letters that are conventionally used for that syllable. Finally, children reach the alphabetic principle, once they understand that the alphabetic script represents phoneme-grapheme correspondences.

This perspective shows that the analysis of the spoken chain is made possible by the interaction with writing. Thus phonological awareness is not a precondition of learning to write, but the interaction with writing is a necessary condition for the development of a phonological awareness (Vernon, 2007). In fact, Vernon, in a study with Spanish speakers, demonstrates that the units available in speech are not usually spontaneously transferred to writing, particularly in the first stages of

the construction of the system (2004). The first segmentations of the spoken chain that children carry out to establish correspondences with segments of the written chain are arbitrary and random. Consequently, children segment the spoken word in strange ways to achieve successive increases of sounds that correspond to the letters they progressively write. I will take an example from this author, which shows how a child 'read' aloud every segment of the chain he was writing. The word he wanted to write is 'triciclo' (tricycle). The child is in a pre-syllabic level, he does not attempt to make one-to-one correspondences between letters and units of speech smaller than the word (Vernon, 2004, p. 38):

Written chain	**Spoken chain**
[A]	tri-ci
[AE]	triciqué
[AET]	tricí
[AETM]	tricí-c
[AETMB]	triciclo
[AETMBO]	triciclo

It is true that children have speech segmenting possibilities and that these possibilities hold a close relation with the structure of the language they speak. Therefore, Spanish-speaking children usually operate on the syllable as the unit of reference. What is interesting about Vernon's research is that it demonstrates that this knowledge is in no way applied spontaneously to writing, as is clearly shown in the example above. Children must, in her own words, 'rediscover' the syllable to solve problems when beginning to establish a relation between spoken word and written word.

Additionally, they will later need to construct a model of syllable that not only responds to the most statistically frequent syllable in Spanish (consonant-vowel, CV), but that can be progressively adjusted to the writing of less frequent types of syllables, such as syllables with complex attacks that combine voiceless and voiced obstruent consonants with liquid consonants in Spanish (/pr/ as in '*primo*,' /pl/ as in '*plomo*,' etc.) or with codas, which are generally simple in this language (/l/ in '*sal*,' /s/ *in* '*gris*,' /n/ *in* '*con*'). In fact, young children present problems when they write these types of syllables during the first years in school, since they tend to regularize complex syllables following the consonant-vowel model; for example, 'busa' instead of 'blusa'. It is possible that the CV syllable is an available graphical model, as Ferreiro & Zamudio (2008) hypothesize. Nevertheless, if the syllable was already acting as a scheme that allowed the child to analyze speech, it cannot be dismissed that its formation is linked to the most common structure in Spanish. Consequently, neither the syllable, which is one of the more salient phonological units in language for children, nor the relation between spoken word and written word are data which are given to or available for the child's mind. On the contrary, they are representations onerously built throughout the alphabetization process, as the constructivist contributions demonstrate.

Research on alphabetization in this line of thought has also made another contribution that corrects Piagetian didactic derivations on pre-school children before the eighties. The fact that these children's hypotheses about writingcannot be attributed to a certain age demonstrates that psychogenetic research itself provides evidence to support the proposition that writing constitutes a specific domain in child development. In other words, learning to write requires a kind of experience strictly linked to the act of writing, which in turn influences linguistic knowledge and the possibility of manipulating the units of language.

On the other hand, the psychogenetic perspective on the writing system differs from the phonological point of view, since it conceives of a writing system as a *representation*. Therefore, there is a difference between the elements and relations belonging to the object to be represented—in this case, language—and "the selection of elements and relations that will be retained by the representation"—writing (Ferreiro, 1988, p. 9). Hence, this line has advanced not only in the explanation of the hypotheses that orientate the construction of the alphabetic principle—that is, a strict relationship between phoneme and grapheme—, but also in subsequent stages, such as the challenges posed by orthography (Díaz, 2004) and punctuation (Ferreiro, 1991 and 1996).

One of the objections to the constructivist position concerns the fact that the syllabic stage has not been formulated based on rigorously empirical principles, and that no evidence of its existence has been found with English-speaking children. The first objection comes from rigorously experimental and quantitative traditions in Anglo-Saxon psycholinguistics. Therefore, it would seem that the Piagetian clinical method, which is introspective and qualitative, is considered 'less rigorous' than observational data of subjects 'situated in very precise experimental conditions' (Rivière, 1991, p. 208). The second objection has the strength of calling into question Ferreiro's (1988, p. 14) assertion that "children's writing follow a surprisingly regular line of evolution, through different cultural environments, different educative situations and different languages", since the structures of languages and writing systems would have an impact on the way children shape the hypotheses that will orient their constructions on writing.

This is the position adopted by advocates of statistical learning, who underline the importance of the input a child is exposed to, a fact which is reported by constructivist research, although it cannot be theoretically explained using this theory. The critical role of stimulus is given a preferential place by the advocates of the statistical learning explanation, as they derive their theoretical support from connectionism. Connectionism posits that information processing is not serial, but parallel, through a large number of units that will be activated according to the information received, sending inhibitory or excitatory signals. The mind, here conceived in a way closer to the brain, has therefore a set of built-in connections and great plasticity in the acquisition of new connections. That is why they can successfully explain both learning and development.

From a theoretical standpoint, then, "learning would be an acquisition of connecting forces that produce the adequate activation patterns in the right circumstances" (García Madruga, 1992, p. 26). This sensibility to stimuli and their properties allows advocates of statistical learning to explain data gathered by constructivism, but which have not been granted a theoretical status. Among them we may mention the child's own name as the dominant source of information and conflict in the first stages of system constructing and the reduction of its effects as the child becomes more exposed to new sources of information in the course of time. Such a position would also explain the differences among spellings at the beginning of the phonetic stage for children that speak languages such as Spanish—prone to consonant elision—and English—prone to vowel elision—, a fact that is clearly dependent from the structure and function of the syllable in both languages.

As such, advocates of this theory maintain that the strategies used by children are sensitive to the properties of their languages and writing systems and that these properties are reducible to statistical proportions. From this standpoint, for example, the syllabic stage described by the constructivist perspective would not be a scheme of analysis of the spoken and written word (Quinteros, 1997); it would rather be associated with the relation of vowels and consonants in Romance languages and to the number of letters whose name coincides with the sounds in these writing systems, that is, vowels. It is unquestionable that the phonological characteristics of a language and its writing systems influence the way children analyze the spoken chain and the way they establish the link to writing. However, it has not been sufficiently proven that these learnings are additive.

2. Correspondences of the alphabetical writing system at morpheme and word levels: the orthographical form of the word

Once children reach the alphabetical principle—that is, the possibility of reading and writing establishing a strict relationship between phoneme and grapheme—they must still face other challenges in this process, among them, the fact that units of the writing system do not establish correspondences only at the phoneme level, but also at the morpheme and word levels.

Certainly, alphabetical writing retains the spoken language chain analyzed into its discrete and distinctive components, the phonemes. However, as it was formerly stated, Catach (1996) has also pointed out that every writing system is mixed. Thus, while graphemes of alphabetical writing systems analyze language on its phonological level, Chinese ideograms analyze its semantic dimension and can therefore be used by speakers of completely different languages, such as Japanese. However, even alphabetical systems have resources that allow them to account for meaning as well, due to their lack of biunivocal grapheme-morpheme correspondence. Consequently, in many languages there are morphemes that only exist in

writing, as Bolinger maintained. For example, Vachek (1973) reports that Russian written norm preserves the graphical form for the morpheme 'vod-' ('water') in the nominative and accusative cases, 'vod-a' and 'vod-u' despite the variations of the spoken allomorph /vad-á/ and /vód-u/. The same occurs in plural morpheme in English, which is written '-s' but is pronounced /-s/, /-z/ or /-iz/. Likewise, in many languages there are homophonic words and their meaning is only discerned in writing. For example, in Spanish, an advanced reader is aware that every graphical form corresponds to a different lexical meaning in cases such as *ha*/*a, hola*/*ola, tubo*/*tuvo*. Vachek (1973) mentions other examples in English: *right/rite/wright/write*; French *tant/temps, sans/sens*; and in German *Häute/heute, Laib/leib, Saite/seite.*

There are some terms that have often been employed to deal with this type of distinction in the linguistic literature, like *orthography, pronunciation* and *spelling*. According to Vachek,

> *Orthography* is a kind of bridge, a set of rules which enable the language user to transpose the spoken utterances into the corresponding written ones. […] *Pronunciation* is an analogous bridge, leading in the opposite direction. […] The term *spelling*, in its turn, […] denotes another important device: it serves to express the material make-up of written utterance by phonic means, *i.e.* by successively naming each of the graphemes composing that utterance. (Vachek, 1973, pp. 18-20.)

Both bridges, orthography and pronunciation, are used by the speakers in the communities where oral and written norms of language coexist in order to switch over from one norm to the other, depending on the demands of the communicative situation. In the case of homophonic words, children have to become aware that words that sound in the same way—because they have the same phonological form—have different spelling depending on their meaning. The only way for a child to know and store the graphical forms of words is by becoming a frequent and autonomous reader.

In the difference between the graphical and the phonological forms of a word lies the possibility of the alphabetic writing system to establish correspondences with a higher language level: morphemes and words. It has lead Catach (1996) to propose that some languages have a written and a spoken sign (*e.g.*, French and English) while others have a single sign with two forms of expression (*e.g.*, Italian and Spanish). In psycholinguistic researches, this difference is pointed out with the terms 'opacity' and 'transparence' (Jiménez *et al.*, 2000).

Yet, one question remains: what is the counterpart of this feature of writing systems through the alphabetization process?

Cognitive psycholinguistics proposes that, in an adult reader, words are stored in specialized memories: a phonological lexicon, an orthographical lexicon and semantic memory. A double route model has been proposed both for reading and writing (Colthearth, 1985) as opposed to stage-based models that, as we have seen,

are suggested by constructivism, among others. One of these two routes can be activated in different circumstances. However, a novice reader has not yet formed a memory of the graphical form of words, a requirement of the lexical route. This is why there is a relationship between expertise in reading and writing and the selected route.

If we consider the model, from the point of view of writing, it could be said that there are two possibilities for the expert writer. In the sublexical route a concept is activated in the semantic system and the corresponding phonological form is searched in the phonological lexicon. The word sounds are converted into graphical signs following phoneme-grapheme conversion rules. The unknown words may be written through this route, but if this route is followed to write words with an arbitrary spelling, mistakes are made. The lexical route also commences by activating a meaning in the semantic system, but then directly activates the corresponding graphical representation in the orthographical lexicon, where the written forms of words are stored.

The explanation for reading inverts the direction of the process since, in this case, it is triggered by the graphical form of the word. In the sublexical route, the graphical units are converted into sounds following grapheme-phoneme conversion rules. If the reader blends the phonemes, the corresponding phonological form is activated in the phonological lexicon and, if the reader knows the word, a concept on the semantic system is also activated. Not only young children use this route to read, but every reader that reads an unknown word. The lexical route also starts with the graphical form of the word, but this route directly activates the orthographical representation that leads to the meaning in the semantic system and its phonological form. It is the most frequent route followed by people who have been reading for years and who have stored, therefore, a significant number of orthographical forms.

It has been maintained that both routes explain reading and writing better in languages that have opaque writing systems, such as English or French. Nevertheless, there is evidence from research on alexia (an acquired reading disorder) for the pertinence of this model for explaining reading in languages that have transparent writing systems, as Spanish (Ferreres *et al.*, 2003). Moreover, this model can explain individual differences in reading in Spanish-speaking children, according to age and level of education. Children move faster in grapheme-phoneme conversion rules, which they master in third grade of elementary school, while the effects of lexical reading are not evident until the sixth grade (Valle Arroyo, 1996).

Recent research from the domain of neuroscience has shown that the ability to read and write has profound consequences in the way the human brain is modeled. Research performed with speakers of languages with alphabetical writing systems shows that literacy produces changes in the global perception of speech, particularly in the possibility of decomposing the sounds of words and putting them back together.

As for the previously analyzed double-route model, it has been shown that there are also changes in the activation patterns of areas of the brain involved in reading for novice and expert readers. This accounts for the passage "from the establishment of an analytical reading route towards the predominance of a full word reading route" proper for an advanced stage (Ferreres, China, Abusamra, 2012).

Tests on Italian and English readers show that, although the same three areas linked to reading are always activated in the brain, the importance given to each varies according to language. Readers of Italian activate the translation area more than readers of English and French, who predominantly activate the word-form area (Blakemore & Frith, 2005, p. 79). This suggests that different writing systems impose different requirements on the brain.

Since brain circuitry has intrinsic properties, the internalization of writing as a cultural tool may only be made possible by reconverting brain structures that have evolved for other purposes. This is the neuronal recycling hypothesis proposed by Dehaene (2012), who also highlights the positive effects of reading for areas of the brain dealing with spoken language. In literate people, the left temporo-frontal network, a zone for the understanding of spoken language, is activated with written language; but, as we have mentioned, it also changes the way that literate people perceive speech and, subsequently, the effort involved and the memory required by this task. The fact that in literate people the area devoted to the visual forms of words is activated when words are pronounced means that "immediate verbal memory is doubled after learning to read" (Dehaene, 2012), since a graphical form is added to representations of speech. However, it is important to note that there are also drawbacks to becoming literate. In fact, in literate people, areas of the brain involved in reading decrease in responsiveness to the stimuli they originally responded to, such as face recognition. The response to faces increases among illiterate people.

What is then the process through which a young child becomes aware of the sounds that compose the spoken chain? Dehaene advocates for analytical methods in teaching, even though, as we have said, it should be remembered that teaching is not the same as learning. It is absolutely true that the process through which speakers become aware of the language they speak is not prompted without teaching. Learning to write requires an explicit transmission that must unavoidably be performed consciously. Speaking, on the other hand—if we were to accept what generative theories have demonstrated so far—is almost an instinct in the human being.

Therefore, it is necessary to take into account the clear warning formulated from the field of neuroscience:

> Unlike in the case of written language, the brain has had millions of years to evolve speech. The processes are deeply embedded and we are entirely unaware of them. The alphabetic system that has come to be the predominant writing system in the world's languages is parasitic on the ancient human speech system.

> But to master it, we need to become aware of the combinatorial process. […] This is not equally easy for all readers. (Blakemore & Firth, 2005, pp. 79-80.)

However, it is likely that the extent of this warning is still very narrow. Writing requires higher levels of reflection on language since writing reorganizes language. The language awareness that writing demands is not only restricted to its combinatory dimension. I will try to explain this, in provisional terms, by turning to the psychologist who inspired socio-discursive interactionism:

> […] (a) the essential difference between written and oral speech reflects the difference between two types of activity, one of which is spontaneous, involuntary, and nonconscious, while the other is abstract, voluntary, and conscious; (b) the psychological functions on which written speech is based have not even begun to develop in the proper sense when instruction in writing starts. It must build on barely emerging, immature processes. […] Written speech is the most elaborate form of speech. (Vygotsky, 1986 [1934], p. 183, 242.)

Vygotsky maintained that it is through speaking that man becomes human. Language progressively becomes a fundamental instrument of action and of thought regulation, a process that is part of a wider movement: superior processes always reorganize what is biologically given and allow us to act with a broader degree of awareness and control. Writing is similar to learning scientific concepts and foreign languages. Hence, this kind of learning requires spontaneous conceptual and linguistic developments, but they have their own scenario for their emergence and further development. This development depends—like every other higher function—on instruction by and interaction with an adult "since instruction given in one area can transform and reorganize other areas of the child's thought" (Vygotsky, 1986 [1934], p. 175). He concluded that writing transforms oral, spontaneous language, since it requires an analytical, deliberate action, unlike oral speech. Therefore, writing brings awareness and distancing from the real communicative situation.

It is clear that writing not only allows us command of our memory and communication with the others; it also allows us to gain awareness of language and the different levels of the composition of discourse, even those that orientate communication before the act of writing itself. Writing entails transcending the limitations of the immediate context. It implies verbalizing presuppositions and physical and gestural contexts. It compels us to calculate the effects of what we said on unknown receivers that we will probably never know and who are located in another space and probably also in another time. Dorra (1997, p. 30) explains the problem in these terms:

> Between orality and writing, writing represents the passage from the relatively continuous to the relatively discreet, from the relatively deep to the relatively superficial. When the pressures of immediate dialogue are suspended, the operation by which written symbols are produced—or deciphered—favors the appearance of an intelligence that tends to linger in the observation—not so

> much of objects anymore, as of signs themselves—, of an analytical intelligence whose semantization of the world has—or should have—the sharpness of the objects of the world that sight demands. Writing, then, privileges a rationality that we, more than once, have mistaken for rationality.

Beyond any doubt, Dorra agrees with Benveniste who maintained that a writer must become aware of language as a reality which is different from the one the speaker uses daily. Thus, language becomes a formal image of language. According to Benveniste, language is the only system able to describe itself in its own terms and so it can interpret other semiotic systems. At the same time, writing makes language objective and so language can become semiotic itself (Benveniste, 2014, p. 127). Furthermore, Dorra maintained that writing has the greatest capacity for interpreting other systems, because it is able to analyze itself and it is able to analyze oral communication. Moreover, it is impossible to write without assessing the variations in the construction of a text produced by the fact of that it is written and not spoken. Hence, writing preserves not only the specific way of constructing written text, but it also permanently establishes similarities and differences in the way of constructing spoken discourse. What is more, writing keeps voice and makes it stronger and more powerful in time (Dorra, 2008).

In the last section of this article I will focus on the new challenges this analytical demand poses to writers.

3. Correspondences between writing systems at a textual and syntactic level: analysis of language and discourse through graphical marks in the visuographic zone

As we have seen so far, writing enables writers to analyze their language at different levels. As for initial literacy, this process demands young children to rediscover the units they use spontaneously in speech, which are not spontaneously transferred into writing. However, writing not only requires the analysis of the spoken chain into discontinuous units, but also the performance of a second analysis with specifically written marks, such as punctuation. These are indispensable to restore the continuity of speech and making perceptibly salient the organization of what has been said. This metawriting level is only made possible when there is enough development in written language, linked to the forms that discourse adopts in any given community.

At this level, we are therefore faced with two problems. On the one hand, the problem of discourse and written language development and, on the other, the generation of graphic possibilities that allow the reader to restore the sense that, in natural oral languages, is articulated by prosody and that, in writing, is analyzed by a series of fundamentally visible devices. Although in this paper we consider the problem from an ontogenetic standpoint, we will dedicate a few words to the phylogenetic perspective, since it is revealing of the nature of the problems we face.

We will now return to the problem from the perspective of writing systems. It is precisely when we consider these resources that establish correspondences at the highest level of language—syntax and discourse—that we better understand Vachek's (1976) assertion that the written norm possesses a specific and, to some extent, autonomous structure in relation to the spoken norm.

If the alphabetical zone of the writing system "digitally" analyzes the spoken chain, what I have called (Cárdenas, 2001) the 'visuographic zone' ('*zona visuográfica*') performs a 'meta-analysis' of that first analysis.

In the first place, some of the components of the visuographic zone attempt to restore the continuity of speech, even though it is a speech fundamentally transformed by a monologic management of discourse. The well-known relationship of some punctuation marks with prosody undoubtedly makes up the earliest practice in the visuographic zone. Let us remember that in the ancient world it was the readers who introduced marking systems in continuous writing with the purpose of facilitating reading aloud. According to Desborde (1995, p. 232), "the Greek diastole, the Latin distinction, is disjunction, discontinuity (and, at the same time, the articulation of elements in a continuum) that cuts human voice into sequences". The high, medium and low points were linked to an organized speech with rhetorical criteria, articulated in periods, colons and interpolated clauses, units that, while certainly semantic, more importantly have "a phonic-prosodic or rhythmic entity" (Luque Moreno, 2006, p. 39).

Additionally, this zone is formed as a condition for the legibility of the page. It is constituted during the Middle Ages, in the 5th century AD when the language of readers was not the same as that of the writers. A series of transformations in writing started to take form, mentioned here following Parkes' (1992) enumeration: the space between words, the development of homogeneous types of font that would constitute the basis of lower case letters, the use of *littera nobilior* to give more visual emphasis to the beginning of a text or section, the isolation of different parts of the discourse by means of blank spaces, the separation of the grammatical constituents of the Latin sentence by way of punctuation marks, and the use of different fonts to distinguish inserted extracts from the main text. Slowly and gradually, these changes became widespread throughout the West. Thus, many of the resources in this zone perceptibly organize what is said, giving different values to the units they make up.

Finally, this area has a metacommunicative dimension, since writers manipulate it when they feel the need to guide the reader's interpretation. Writers can only rely on the space of the page as an aid to do so. The marks of the visuographic zone operate in a pragmatic dimension as an ostensive resource of interpretation that the reader must infer. That transformation is what has turned writing into a text, as we know it today, and this zone marks the beginning of the autonomy of writing with respect to the spoken language. For this reason, it is the most versatile area, as it is modified according to the demands that the communities of readers make to the written page throughout different social and cultural periods.

As I have maintained in previous work (Cárdenas, 2001), this zone is formed by elements that must be understood as legibility marks that exploit the possibilities of the graphical substance as an agent of writing. Space virtually gives form to every unit of the written language, from the largest to the smallest—text, paragraph and word. Color not only highlights the elements that the enunciator wishes to emphasize, but also conveys affective and symbolic values. Graphical marks—such as width, size and shape—that are found in the same alphabetical zone and allow typographical variations, not only have an expressive value, but also establish textual hierarchies by allowing the determination of different values about what is being said. As we can see, all of these marks make up the *mise en page* (Catach, 1980) as we know it today. It is an open inventory whose possibilities for combination and implementation are multiplied due to technological advances (for a reflection on the semiotic possibilities, cf. Klinkenberg, 2005). Punctuation, which is specifically situated inside the text also, belongs among these resources. Its functions are to segment and qualify a written text. Indeed, these types of graphical mark signal boundaries by means of setting unit's hierarchy—paragraphs, sentences, words—and signal the role that the segment plays in discourse, which implies both pointing to the assertive, interrogative and exclamatory modalities and attributing parts of text to different enunciators (Halliday, 1992). Some punctuation marks establish a flexible relation with prosodic features—*e.g.*, the period or the question marks—but others carry written information that concerns the written norm specifically—*e.g.* the inverted commas. There are even languages, like German, in which the use of commas is not necessarily linked to prosody: it systematically analyzes hypotaxis, one of the types of structures generated gradually in languages as a result of changes introduced by writing (Givón, 2005).

We can observe that these marks critically examine language and discourse from the point of view of signification, as Dorra (1997, p. 30) maintains:

> Visual, analytical, aware of the action of signs, this rationality is a continuous critical exam of reality but mainly a critical examination of the signifying forms since, according to it, reality is always bound to signification.

Undoubtedly, the analysis performed by graphical marks is a challenge in the process of learning to write. Children face delimitation of units that do not exist as such in the flow of spoken language: words, sentences, paragraphs. Graphical marks, like the space between words and paragraphs, like punctuation marks, like capital letters, make these units visible or produce them. They are not formal but practical and flexible units, which are delimited by heterogeneous criteria: prosodic (accent, intonation), semantic, structural autonomy or syntactic, length, pragmatic function and the way of enunciation (Berrendonner & Reichler-Beguelin, 1989). They exist solely in the written sphere and are created through exclusively visual marks. As Dorra (2008, p. 102) said, "speech has needed to see itself in the writing mirror to recognize itself as a linguistic process which leans on a system".

I will discuss below only part of the results of a study about the conformation of discourse and the use of graphical marks at the ages of nine and eleven. I analyzed 112 texts (letters and stories) and 48 revision interviews with the purpose of investigating how children construct the visuographic zone when composing a written text (Cárdenas, 2008). I did not use experimental situations during the writing and revision processes, but I organized the communicative situation and later, when the first versions had been already written, I asked children to make a revision of their own texts. I have observed the task progress and I have posed questions about their decisions about the visuographic zone. In this way, I could explore writing problems that children encounter and the role of graphical marks as they sort them out.

I worked with 66 children that attended third and fifth grade in an urban and two rural schools in Salta (Argentina). There are marked social, economic and cultural contrasts between the school communities. The letters from children who live in the capital city of Salta triggered communication between them and the short stories were sent along with the letters. The folk story was well known by children, but it was re-told to them before being written. The purpose of the research was to study the discursive demands in the use of graphical marks and the differences in the way children from literate and illiterate communities—to which the foresaid schools belong—delimit units and qualify them in the written texts.

Now I will mainly focus on the way verbal and graphical resources interact inside the texts. First, it is necessary to point out that there is a link between the use of visuographic resources and of verbal resources, which have been recognized as indicators of reflective consciousness. Indeed, cognitive research (Fayol, 1986, 1989, 1997) maintains that connectors and punctuation are devices used by the writer with the aim of allowing the reader to reconstruct the initial cognitive representation. The prior hierarchy of this cognitive representation is altered by the linearization that the production process imposes. Linguistic elements spatially apart from each other may represent similar or proximate referents, while linguistic elements whose referents are unrelated may be juxtaposed. Consequently, an interpretation problem arises, as there is a principle that prescribes that 'next to' corresponds to 'being notionally related to.' The writer then uses the different marks of the scale provided by punctuation in order to signal the degree of relation (or rupture) between clauses. Connectors are used not only to explicitly indicate the existence of a relation, but also its nature. Thus, punctuation marks and connectors represent a trace of the linearization process. This position has also been taken up by Socio-Discursive Interactionism (Schneuwly, 1988).

In turn, constructivist research clearly points out the relation between direct speech and punctuation in children's texts (Ferreiro, 1991, 1996). In fact, reported speech is one of the most studied metapragmatic phenomena: we can reproduce speech since language is reflexive. Let us remember that direct speech allows for representing speech, while indirect speech allows for its characterization, since

it reproduces and evaluates what others say (Lucy, 1993). In her first report on the subject, Ferreiro states that fragments of direct speech constitute a privileged situation for children to turn to punctuation: in these fragments, there is more variety and frequency of these marks. The second report states that the presence of direct speech does not guarantee by itself the presence of punctuation, but that the real predictor of punctuation marks is when the reporting verb is placed after direct speech and not before: "*¡Qué ojos tan grandes tienes!, dijo Caperucita*" ("What big eyes you have!, said Little Red Riding Hood"). The relation between both phenomena is partially explained by the fact that both account for the "intention to produce a text to be interpreted, and not merely representing an oral narrative through graphics" (Ferreiro, 1996, p. 148) and, moreover, because verbal resources (*e.g.*, lexical repetition of reporting verbs) and punctuation "may express the same search for internal boundaries in the modes of enunciating or episodes in a full narrative" (Ferreiro, 1996, p. 179).

From my point of view, the interaction between verbal and graphical resources in children's written text may be understood if we take into account the fact that, in both cases, we are dealing with metapragmatic indicators. Both types of resources are the result of an analysis of language with the purpose of showing the readers the degree of relation between utterances. Consequently, the verbal indicator may appear next to the graphical indicator, or one can 'make up' for the other. In these cases, we are dealing with the traces left in writing by the children's awareness of communication.

In children's writing, graphical resources that accompany or replace verbal resources contribute to the intelligibility of what is said, since they organize, define and qualify speech. This is the case for texts written by children in the urban school and some of the fifth graders in the rural school. However, verbal resources may only partially fulfill the function of graphical resources. This situation prevails in texts written by third graders in the rural school. Indeed, they are unable to reveal the organization of discourse, in the way that specific graphical resources. This would confirm Vacheck's (1976) assertion: verbal resources cannot organize, define and qualify speech in the same way that graphical resources do. Verbal resources cannot speak "quickly and distinctly to the eyes" (Frinta, 1909, p. 36). That is the reason why, when in children's texts verbal resources completely replace graphical ones, the texts themselves do not work as such.

For this reason, I find it advisable to see the relationship a child establishes with discourse and with the written text as a spatial materialization of discourse. Thus, a child's writing may reveal an appropriation of the universe of discourse, of its organization and of its purpose. However, the graphical resources specific to writing may be absent. By graphical resources I mean the punctuation marks found in the text. These marks analyze the verbal chain and expose the way in which the verbal object is organized.

Likewise, the more children interact with written language the larger the perception they have of the metapragmatic value of graphical resources. The less children interact with written language (even if they know punctuation marks from school) the less confidence they have in the value of punctuation marks, which implicitly indicate semantic features to the reader. Indeed, a graphical mark functions due to conventions of the literate community that indicate how to use it and how to interpret it. On the contrary, verbal formulation gives them, the certainty granted by explicitness and, on the other hand, accessibility given by the sole command of the alphabetical zone, independent of conventions that regulate the visuographic zone in the text.

Therefore, all these specific structural marks can only be thought and written by children who have been educated as active users of written language. We should keep in mind that punctuation marks have been gradually developed by our culture over millennia and given the whole relationship the writer establishes with the reader under certain historical and social circumstances. Children from rural areas analyse the verbal chain with verbal resources, such as:

- enumerations: "*plantamos lechuga choclo zapallo Hacemos con arcilla hacemos ollitas collares después comemos y damos gracias nos lavamos los dientes y nos vamos a bañar y a la tarde tenemos clases con el maestro y la señorita Cuqui y la señorita Rosa* […]" ("we plant lettuce corn pumpkin We make with clay we make pots necklaces and then we eat and give thanks we brush the teeth and we take a bath and in the afternoon we have classes with the teacher and miss Cuqui and miss Rosa […]" (Felipa's letter, 3rd grade)
- parallelisms: "*el zorro le dijo la parte de arriba será mía y la parte de abajo será de usted, el zorro quedó con todas las hojas y tallos y el quirquincho quedó con toda la papa*" ("the fox told him the upper part will be mine and the lower will be yours, the fox took all the leaves and stems and the armadillo took the whole potato") (Luis' story, 5th grade)
- repetitions of organizing elements or expressions with metadiscursive value, which can be observed in Jesica's letter (3rd grade): "[…] *tú eres mi mejor amiga* y te voy a contar que *por eso te escribo esta carta estoy en tercer grado y tengo ocho años* y también te voy a decir que *me gusta Cafayate y el Divisadero al lado del cerro está mi escuela* y te voy a decir que *tengo unos primos en el lugar adonde está tu escuela*…" ("you are my best friend *and I will tell you that* that is the reason I am writing this letter I go to third grade and I am eight years old and *I will also tell you that* I like Cafayate and Divisadero next to the mountain there is my school and *I will tell you that* I have cousins where your school is…"). See also Rita's letter (5th grade) "[…] *y ahora te cuento de mi escuela*" ("and now I tell you about my school").
- repetition of reporting verbs, before and after direct speech: "y el zorro le dijo al quirquincho *este año será todo lo que dé arriba y lo que dé abajo para mí* dijo

el zorro" ("*and the fox said to the armadillo* this year everything that grows at the top and bottom will be mine *said the fox*") (Ricardo, 5th grade, RS); or reporting verbs within direct speech—"*como no* le dijo el quirquincho *como usted diga*" ("sure *said the armadillo* whatever you say") (Vilma, 5th grade, RS).

The difference between texts written by children from urban and rural schools is that the latter never use punctuation marks in these kinds of segments. They do not rely on punctuation to introduce a new topic or to separate phrases or items in a series. Some of them explain that these kinds of marks can only be used when they copy a text from a schoolbook in the classroom, but not if they write a letter or a story for a friend.

As such, our research coincides with Günther Kress' observations (1994 [1982]) on the development of the notion of sentence in children in its three main points. Firstly, the way children use punctuation is part of the wider process of learning "new forms of syntactic and textual structure, new genres, new ways of relating to unknown addresses" (1994, p. 62), that is to say, the process of learning written language and written communication. Secondly, the segmentation performed by children in a written text has a textual rather than a syntactic motivation. Finally, the genres of discourse have different cognitive and linguistic demands in the writing of narrative and non-narrative texts. Now, in the case that I have presented, the empirical base has been broadened with the study of the demands of the genres of discourse with respect to the use of graphical marks, particularly epistolary and narrative genres.

My research shows that different social groups in Latin America produce and perform different genres. Therefore, children from urban schools have more experience with letters, while children from rural schools are experts in stories that belong to oral traditions. In fact, the stories lose their rhythmical resources when written by city children and they are transformed into an optical construction: texts are analyzed internally with capital letters, spaces and punctuation marks.

However, beyond this observation, genres themselves impose restrictions on the *visuographic* zone. The *mise en page* takes priority for children of both schools when they write letters. Other kind of marks, like color, typographical variations, space and underlining, are concentrated in the initial and final parts of texts, especially in letters, *i.e.*, places with more communicative intensity and strong subjectivity. These marks, which contribute to the graphic organization of the whole text on the page, are not related to the inner punctuation. The lack of relation is probably due to the kind of functions that both kinds of marks fulfill. On the one hand, punctuation fulfills *heteronomic glossic* functions whereas color, typographical variations fulfill *grammatologic* functions. Klinkenberg (2005) named *heteronomic glossic* functions the linguistic functions that are optional, and *grammatologic* functions those which relate to the material space as a dimension of writing. In the body of the letter, children cut out units with graphical marks that coincide with the thematic entities that their discourse describes, classifies

and organizes (house, family, friends, school, and so on). Switching thematic units allows for the perception of boundaries and its subsequent graphical signaling.

On the contrary, in the stories, the time of enunciation does not stop until the story ends. Consequently, children from rural schools only resort to graphically signaling the three motives that make the agonistic structure of the struggle between the fox and the armadillo. They only accept using a full stop where the story "stops" ("*se detiene*"), according to some, or "ends and starts over again" ("*termina y luego vuelve a empezar*"), according to others. For instance, Luis does not want to introduce any kind of punctuation in his story because "it went on talking about the fox and it went on and on, nonstop" ("s*igue hablando del zorro y sigue y sigue imparable*"). In urban schools, children react to temporal succession by assigning a temporal value to the graphical mark and placing it between utterances. For instance, Ana Sol said that she used ellipsis when "I want the story to wait for a while" ([*usamos los puntos suspensivos*] "*cuando queremos que espere un rato el cuento*").

Consequently, I maintain that the first motivation for the graphical delimitation performed by children has a discursive nature. It is influenced by aspects such as the relation with the interlocutor, thematic changes, succession, temporality, event organization and reported speech. The text analysis will later move from paragraphs to sentences and then to units inside the sentence. It is a matter of handling discourse as a whole and later the sentence as a syntactic and semantic unit, as Kress said. Only later with scooling will the child delimit units of a strictly syntactic nature; this is one of the reasons why constructions generated by expert writers are different from the ones novice writers produce.

Following what has been said, the intensity of the children's interaction with written texts and the possibility of being readers and writers are factors that certainly influence the way a writer analyses discourse, delimits units in texts and qualifies them through graphical marks.

4. Conclusion

Throughout this paper, I discussed the relation between writing and language from a specific perspective: the perspective of a child facing the challenge of learning to write.

First, writing is a new process of conformation of a verbal message. Face-to-face oral interaction is strongly contextualized and the message is formed as a joint construction between interlocutors, but even oral forms of discourse evolve towards a progressive decontextualization. This oral use of decontextualized language is an important bridge towards the changes writing produces in language, particularly in the management of monologic discourse. In fact, the dynamic interaction between spoken and written language is permanent in literate people, since it is influenced by discursive genres characterized by communicative distances that are

more closely related to the materiality of writing (Oesterreicher, 1988). The process of acquiring new lexemes and more morphological and syntactic structures is the product of literacy, and results from (1) the relation between language and context and (2) the diversification of the contexts of use. Written language requires a communicative distance between transmitters and receivers, the permanence of the information and an autonomous organization with the permanent and explicit stating of the reference. Therefore, it requires complex syntactic structures targeting a high degree of internal cohesion (Hoff, 2001).

Second, children face the challenge of turning units that they use automatically and unconsciously everyday into units capable of being heard and manipulated, with the inconvenience that the least accessible unit, the phoneme, is required by the alphabetical writing system. Thus, we are dealing, as Vernon suggests (2007), with a process in which units need to be "rediscovered" so that, being available to the mind on another level, they may become tools that allow for the analysis of the relation held by the spoken chain and the written chain. However, it is important to take into account the fact that children will only begin to be aware of units in the spoken chain when faced with the problems that writing poses. This is the only way in which children discover how to use this knowledge when writing. As neuroscience shows, only literate people can be aware of the sounds of language.

Third, a child that reads often does not only store the phonological forms of the words, but also the orthographical ones. Reading utilizes universal brain circuits: the areas of the brain involved are the same for everybody. Written stimuli, once they are recognized, are sent either through the route that turns them into sound or the route that turns them into meaning. In an expert reader, both routes are triggered automatically and in parallel, and one or the other becomes more active according to the word and the differences between languages and writing systems, as is maintained by cognitive psycholinguistics and neuroscience alike.

Finally, children face the problem of their writing showing not only their interpretation of the spoken chain, but also the text generation. They must 'produce' units that do not exist as such in the flow of spoken language. For instance, words, sentences and paragraphs and even the text itself. It is not simple to make the articulations of meaning conspicuous by using only a series of graphical devices, legibility marks that work analogically and that only exist by virtue of the written substance.

These results also confront us with an hypothesis: school is not enough for literacy, school is a factor whose success depends also on the degree of literacy of the family and the social group in which children interact, and even on the environments where they interact throughout their lives. However, public schools are the only places where a great number of children interact with the written norm of language in places like Salta, in countries like Argentina. The relation between writing, thought and schooling is not sufficient but rather the conditions in which writing is produced, the metalanguage with which a written text is organized and

analyzed and finally the changes of knowledge when it is exhibited and stored in writing. Writing has a strong impact on the structure of language itself.

For this reason, children cannot be offered a single way of accesing the written world. Even if some zones demand analytical methods—such as the phonographical zone in the writing system—, other zones—such as the visuographic—demand that the learning of written language not be disassociated from the way a literate culture operates. I insist therefore on an analogy used in a previous work (Cárdenas, 2008) to explain this problem. Wittgenstein maintained that when somebody is shown a king chess piece and told "This is the king", the way the piece is used is not thus explained, unless they already know the rules of the game. Consequently, nobody can teach children the value and use of a game piece of a writing system if they do not already know the goal and rules of the game of literacy.

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